CLAIMS

WHAT IS CLAIMED IS:

1. An apparatus for fabricating oriented polymer fibers, the apparatus comprising:

(a) a dispenser for containing an electrically charged metastable polymer dispersion, the dispenser including a proximal end and a distal end, where the proximal end defines an orifice;

(b) an electrode positioned near the orifice, wherein the electrode and the orifice define a gap therebetween; and

(c) a collector for receiving the oriented polymer fibers, wherein the collector is positioned at a distance from the gap.

2. The apparatus of claim 1, wherein the dispenser is connected to a source of electric potential for charging the polymer dispersion.

3. The apparatus of claim 2, wherein the source of potential is a direct current battery.

4. The apparatus of claim 1, wherein the polymer dispersion comprises a polymer and a liquid phase.

5. The apparatus of claim 4, wherein the polymer is selected from a group consisting of poly(vinylidene fluoride-co-trifluoroethylene) and poly(lactic acid-co-glycolic acid).

6. The apparatus of claim 4, wherein the polymer dispersion further includes doping ions.

7. The apparatus of claim 4, wherein the polymer dispersion further includes a surfactant.

8. The apparatus of claim 4, wherein the polymer dispersion further includes a biological molecule.

9. The apparatus of claim 4, wherein the polymer dispersion further includes a compound decreasing the stability of the metastable polymer dispersion.

10. The apparatus of claim 9, wherein the compound decreasing the stability of the metastable polymer dispersion is sodium chloride.

11. The apparatus of claim 1, wherein the collector is grounded.

12. The apparatus of claim 1, wherein the dispenser is fabricated of glass.

13. The apparatus of claim 1, wherein the orifice is a capillary tip.

14. The apparatus of claim 1, wherein the orifice has a diameter between about 10 nanometers and 100 micrometers.

15. A method for fabricating oriented polymer fibers, the method comprising:

(a) positioning an electrode near an orifice of a dispenser containing a metastable electrically charged polymer dispersion, to form a gap between the electrode and the orifice, wherein the dispenser has a proximal end and a distal end, and the orifice is defined by the proximal end of the dispenser;

(b) electrically pulling the polymer dispersion from the orifice by applying electric voltage to the electrode; and

(c) collecting the oriented polymer fibers at a collector located at a distance from the gap, and allowing the electropulled dispersion to solidify, wherein the collector is positioned at a distance from the gap, to form the oriented polymer fibers.

16. The method of claim 15, wherein the dispenser is connected to a source of electric potential for charging the polymer dispersion.

17. The method of claim 16, wherein the source of electric potential is a direct current battery.

18. The method of claim 15, wherein the metastable polymer dispersion comprises at least one polymer and a liquid phase.

19. The method of claim 18, wherein the liquid phase comprises one or a plurality of liquids.

20. The method of claim 18, wherein the metastable dispersion is fabricated by dispersing a polymer in the liquid phase.

21. The method of claim 18, wherein the metastable dispersion is fabricated by dissolving a polymer in a solvent to make a polymer solution, and dispersing the polymer solution in the liquid phase.

22. The method of claim 18, wherein the polymer is selected from a group consisting of (vinylidene fluoride-co-trifluoroethylene) and poly(lactic acid-co-glycolic acid).

23. The method of claim 18, wherein the metastable dispersion further comprises a compound for decreasing the stability of the metastable polymer dispersion.

24. The apparatus of claim 23, wherein the compound decreasing the stability of the metastable polymer dispersion is sodium chloride.

25. The method of claim 18, wherein the metastable dispersion further comprises biologically active molecules.

26. The method of claim 18, wherein the metastable dispersion further comprises at least one surfactant.

27. The method of claim 15, wherein the collector is grounded.

28. The method of claim 15, wherein the orifice is a capillary tip.

29. The method of claim 15, wherein the orifice has a diameter diameter between about 10 nanometers and 100 micrometers.

30. The method of claim 15, wherein the electric voltage applied to the electrode is between about 20 kV and 40 kV.

31. The method of claim 15, wherein the distance between the gap and the collector is between about 10 centimeters and 30 centimeters.